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MANAGING RANGELANDS FOR THE AMERICAN PRONGHORN ANTELOPE

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Highlight: Pronghorns thrive best on rangelands with a diversity of vegetation, an abundance of grass-forb-browse, plants with high succulence, and growth height from 38 to 61 cm. Cultivated crops usually are not consumed extensively except alfalfa which is highly preferred. Antelope densities are best on range where water is available every 2 to 8 km. It is desirable to have 1 to 4 liters of free water available each day, particularly during the warm dry summers. These big game animals use man-made water developments such as reservoirs, troughs and water catchments. Fences which restrict antelope movement for habitat requirements can be detrimental, especially for migrating herds during winters of deep snows. Woven wire fences are generally a barrier and therefore, are not recommended on antelope ranges. Vegetational type manipulation projects can be advantageous or deleterious as defined. Ranges managed to meet the habitat requirements of antelope can be maintained or improved for the welfare of antelope today.

INTRODUCTION

Today the American pronghorn antelope (Antilocapra americana) inhabits many historic ranges occupied during the early 1800's. The antelope's pristine numbers, however, have been greatly reduced. These native big game animals were on the verge of extirpation at the turn of the 1900's, but have experienced a 1,500 percent increase during the past 50 years. Pronghorns coexist on western rangelands from northern Mexico, up through all the western states of the U.S., and into the southern short grasslands of south-central Canada. They coexist with domestic livestock now just as they did with the American buffalo (Bison bison) for centuries prior to the arrival of European man (Yoakum 1968).

The objective of this paper is to identify recommended range management practices to maintain or improve forage, water, and range conditions in accordance with the habitat requirements of the American pronghorn antelope.

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Findings and recommendations in this report were gathered over 25 years of research and field studies conducted in Canada, Mexico, and the United States. In addition, the author has relied heavily on State and Federal agencies' input into the antelope chapter of a report entitled "Wildlife Habitat in Managed Range Environments" being drafted (Kindschy et al, in prep.).

ANTELOPE HABITAT REQUIREMENTS

To better understand the interrelationships of pronghorns to rangelands, it is imperative to know the animal's requirements for range characteristics (forage, water, space, etc.). Table 1 lists antelope requirements as developed to date for a sagebrush-grassland community. These requirements must be available in the correct combination. It is not sufficient to have an over abundance of one component and an inadequate quantity of another; nor can there be a total lack of any one.

Some ranges produce and maintain more antelope per range area than adjacent ranges because of the combination of habitat characteristics.

Recent studies (Sundstrom et al 1973, and Yoakum 1972) link antelope densities with vegetational communities. Table 2 provides a summary of these findings. It is apparent that high antelope numbers are related to the short grasslands and shrub-grassland steppes.

RECOMMENDED RANGE MANAGEMENT PRACTICES

VEGETATION

The primary principles of managing vegetation for antelope are:

1. Maintain existing native forage plants when the vegetation is in a good ecological condition and meets the requirements of antelope.
2. When the vegetation is in a poor ecological condition, or when one or more of the vegetative characteristics are inadequate for the antelope's habitat requirements, vegetative type conversions can be accomplished to correct the lacking quality components.

Native Rangeland

Native rangelands which have developed over eons into natural vegetative communities, and remain in good condition today, should be maintained in good condition. This is especially important to historical antelope ranges which possess vegetal characteristics favoring antelope habitat requirements identified in Table 1.

It is postulated that pronghorns thrive best on ranges in a subclimax vegetative condition. Such conditions were created by (1) wildfires caused by lightning, and (2) seasonal grazing by herbivores such as bison, elk (Cervus sp.), and deer (Odocoileus sp.). The vegetative community was in constant change which in turn produced a variety of mixed forage classes of grasses, forbs, and shrubs.

Vegetation Type Conversion

Extensive areas of dominant (more than 30 percent) big sagebrush (Artemesia tridentata) are often low density ranges for antelope. This is especially true where the brush is 76 cm. or higher. Such areas can be treated to decrease sagebrush quality and height thereby creating desirable antelope habitat. One of the major objectives of brush control is to decrease shrubs which are competing with grasses and forbs. Two points should be considered in such treatments: (1) it is best to plan projects not too large in size (preferably less than 405 ha); (2) the project should maintain around 5 to 10 percent shrub cover.

Brush control is frequently accomplished by mechanical practices such as plowing or chaining. Plowing with large brushland plows often kills native plants, especially highly preferred forbs. Chaining is accomplished by two large tractors pulling a heavy anchor chain between them. This practice does not kill as many shrubs and is less damaging to native grasses and forbs.

Chemical spraying is another commonly practiced shrub control technique. The spray can be largely plant specific thereby controlling sagebrush and not harming native grasses and most forbs. The practice can favor antelope ranges with low sagebrush but leaves tall dead shrubs on big sagebrush treated areas.

Prescribed burning has been used to date in only limited cases to improve antelope ranges. This practice has many natural characteristics favorable to improving ranges for antelope. When properly accomplished, prescribed burning can decrease dominant shrubs and create a more natural mixed community of grasses, forbs and shrubs (Beardahl and Sylvester 1974, Page 1975, and Lovaas 1976).

Antelope ranges having insufficient native plants for natural reproduction, can be seeded. Past seeding ventures have often resulted in monocultures of exotic grasses. These seedings have limited value to pronghorns other than a decrease in shrub quality and height. However, mixture seedings have often proven highly beneficial to pronghorns, especially when legumes have been planted. Mixture seedings are optimized when there are a number of native

species planted. A good rule of thumb is a minimum of 6 species each of grasses, forbs, and shrubs.

Introduction of dryland Nomad variety alfalfa (Medicago sativa) was one of the most successful techniques accomplished on antelope ranges in southeastern Oregon (Kindschy 1974). In excess of 22,700 ha involving 36 separate seedings have been planted to date. The alfalfa was generally aerially seeded onto plowed sagebrush ranges following drilling to adapted grasses and shrubs. Recent analysis of the seedings disclosed that the majority have maintained alfalfa composition at a level of 10 percent of the vegetation present over a six year or longer period. The seedings have increased the forb composition from 2 percent in untreated areas to 7 percent in seeded areas. During the August 1976 antelope census, more antelope does with fawns were observed in grass and forb seedings than on adjacent shrub dominant rangelands.

All vegetative type conversion projects should be planned in conformance with the basic principles and procedures for successful game range restoration identified by Plummer et al (1968). These procedures have wide application on similar sites throughout the West. They are referred to as "the 10 commandments for success" of game ranges, and briefly are:

"1. Changes in plant cover by the proposed measures must be determined to be desirable.
2. Terrain and soil types must be suited to the changes selected.
3. Precipitation must be adequate to assure establishment and survival of seeded plants.
4. Competition must be low enough to assure that desired species can be established.
5. Only species and strains of plants adapted to the area should be planted.
6. Mixtures, rather than single species should be planted.
7. Sufficient seed of acceptable purity and viability should be planted to assure getting a stand.
8. Seed must be covered sufficiently.
9. Planting should be done in the season of optimum conditions for establishment.
10. The planted area must be adequately protected."

While there is still a great deal to be learned in developing precision to reduce costs, successful shrub treatment and seeding of large areas depends on following these time tested procedures. Their importance for planning and implementing vegetative manipulation for wildlife cannot be over emphasized.

Cultivated Crops

Antelope can be attracted to cultivated crops, especially alfalfa, a highly preferred forage species. Winter wheat is another crop to which pronghorns may cause depredation, mainly through mechanical means of trampling and bedding. Overall, pronghorn problems regarding the use of cultivated crops is minimal.

WATER

Quantity

Measurements were made of water consumption by antelope on the shrub-grass steppes of Wyoming (Sundstrom 1968). Daily water consumption rates per antelope varied from .34 liter per day in May to 4.5 liter per day in August. Total monthly precipitation, evaporation, succulent vegetation, nursing does, mean temperature, and average maximum temperature had marked effects on the average daily water consumption rates. Working in Utah, Beale (1966) found that from 1 July to 15 August, antelope on semi-arid lands consumed 1.1 to 1.9 liter of water daily.

Quality

Little information is available concerning water quality as it affects pronghorns. However, total dissolved solids and pH are probably the most common concerns. In the Red Desert region of Wyoming, Sundstrom (1968) found little or no use by antelope of water sources which contained total dissolved solids in excess of 5,000 ppm. The maximum total dissolved solids recommended for best game support is about 4,500 ppm (McKee and Wolf 1963).

In Wyoming's Red Desert, it was found that when water sources exceeded a pH of 9.25, antelope appeared to seek other water sources (Sundstrom 1968). Recommended pH level for most uses such as domestic water supplies, irrigation, fish and other aquatic life, swimming and other recreation uses, appears to be from 6.5 to 8.5 (McKee and Wolf 1963).

Distribution

A close relationship was observed between antelope and water distribution in Wyoming (Sundstrom 1968). Ninety-five percent of 12,000 antelope counted by air were within a 6 km radius of water.

Types of Developments

During a 5 year study of pronghorns in Wyoming, antelope were seen using every type of water source available. These consisted of

springs, creeks, rivers, lakes, and reservoirs (Figure 2), stock water developments, galvanized troughs fed by windmills, and troughs filled by springs. Antelope did not appear to avoid any manmade water device developed for livestock.

The installation of precipitation catchment facilities (guzzlers) on ranges lacking proper water distribution have been successful for antelope (June 1968, Sundstrom 1968). Such water developments are relatively maintenance free, not expensive, and serve a variety of wildlife and domestic livestock.

FENCES

Fences can be major obstacles when antelope mobility is restricted to procure food, water, or escape from deep snows. This is most paramount for traditional antelope migrating herds moving from summer to winter ranges. Where fence restrictions occur, significant changes in distribution of herds, death to individual pronghorns, or losses of carrying capacity have resulted (Oakley 1973, Sundstrom 1970, Martinka 1967, and Hailey et al 1977).

Recommendations from antelope-fence studies (Spillett 1965, Spillett et al 1967, Zobell 1968, Mapston 1972a, Interstate Antelope Conference 1962, and U.S. Bureau of Land Management 1975) state that when fence construction is necessary, the following specifications are best for antelope welfare:

1. Net-wire fences are generally barriers; therefore, their construction on antelope ranges is discouraged.
2. Barbed wire fences should be constructed to the following specifications:
   a. bottom wire at least 41 cm from the ground.
   b. next wire up 25 cm.
   c. next wire up 25 cm, comprising a total of 91 cm height from ground.
   d. bottom wire should be smooth wire, for antelope generally go under fences, barbless wire minimizes physical injuries.
   e. no stays between posts, as this provides for a less tight fence allowing easier antelope passage.
   f. important antelope travelled pathways, migration routes, etc., should allow for low-height or lay down panels, or pass structures.
   g. keep fenced areas as large as possible, thereby providing an opportunity for antelope to obtain all the basic habitat requirements listed in Table 1.

$\frac{36 \text{ in}}{91.44 \text{ m}} = \frac{X}{41 \text{ cm}}$

$1476 = 91X$

$X = 16''$

"Antelope Passes" have been used in some areas to facilitate antelope movement through fences (June 1965, Mapston 1972b). These devices are essentially miniature cattle guards 122 cm wide rather than the standard 312 cm structures (Figure 1). Vehicles cannot cross these structures. "Antelope Passes" are placed at locations characteristically used by antelope. Corners of fence lines are a favorite location for the installation of this type of device. Passes, when properly placed, help facilitate antelope movement but are a second choice to properly constructed fencing.

GRAZING SYSTEMS

Livestock management is turning more to establishing grazing systems for livestock use of rangelands. There are numerous systems with designed procedures for grazing depending on local economic and environmental conditions. All of these systems should consider the following criteria when such systems are developed for lands used dually with wild pronghorn herds:

1. When allotting quality and quantity of vegetation for antelope, these forage needs will be given.
   a. The right species of all vegetation will be recognized as forage for antelope. This includes grasses, forbs, and browse based upon correct up-to-date proper-use factors.
   b. All forage plants will be assured availability for antelope for the seasons of need.
   c. Forage will be reserved for a reasonable number of pronghorns. Reasonable numbers will be based upon (1) the average herd population for the past 30 years, and (2) average forage productions for the last 15 years.
2. All waters will be maintained for antelope for the seasons the antelope are in the pastures.
3. Livestock fence construction will meet specifications deemed appropriate for antelope movement specified in the Antelope Regional Fence Workshop (U.S. Bur. Land Mgmt. 1975).
4. When grazing systems are designed with key plant species, plans will include forb and browse as key species, thereby assuring that the systems will be based upon phenology of these key species for antelope habitat requirements.
5. Livestock grazing systems which restrict, alter, limit, or deleteriously affect the habitat requirements of antelope, must include mitigating measures and alternate procedures to enhance antelope habitat.
6. "Prescription grazing" - using livestock to achieve vegetative form or composition objectives - should be practiced in seedings and certain native ranges where high antelope habitat values exist.

DISCUSSION

Habitat improvements specifically designed to improve range conditions for pronghorns are few and have had possibly only a minor affect on antelope populations. However, many range improvements constructed for other purposes have had some major affects, both advantageously and deleteriously, on antelope. This entire subject is not well documented in reports or publications, but more information is becoming available and warrants discussion at this time.

Fences constructed to control livestock or delineate highway rights-of-way have been reported repeatedly as a serious mortality factor to antelope. Such reports are substantiated for the open grasslands of Wyoming (Oakley 1973) to the semi-arid regions of Texas (Hailey 1977). The deleterious affect of both direct entanglement mortality and the much greater factor of entrapment and restricting migrational movements for survival are well documented. This does not mean that all fences are problems to antelope everywhere, but the evidence is substantial that fences are a serious mortality problem to certain antelope herds on a regional basis. It is also known that proper fence construction planning to include designs allowing more free antelope movement would do much to enhance antelope welfare (U.S. Bureau of Land Management 1974). It would be well for all managers responsible for planning and constructing fences on ranges where wildlife values are of importance, to consider the tried and tested fence designs which allow access by antelope.

Just how beneficial vegetative type conversions or water developments have been to pronghorns, is a matter not quantitatively reported to date. However, this subject is becoming increasingly apparent as more cases become known. There are two recent cases that substantiate well the values of multiple range improvements for the benefit of antelope.

At the third biennial Antelope States Workshop, Kerr (1968) reported on the interrelationships of antelope to habitat for the Tres Piedras herd in north central New Mexico. This area underwent extensive vegetative type conversions, fence construction, and water developments primarily for livestock but with proper considerations for antelope habitat requirements. The results within three years recorded a 130 percent (from 300 to 750) increase in the antelope population.

The second case of a large-scale range rehabilitation program affecting antelope numbers is the Vale project in southeastern Oregon. The project encompasses 100 - by 180 km of primarily sagebrush-grassland steppe rangelands. During an 11-year period, approximately $10 million was spent on the following range improvements: 205,000 ha brush control; 108,000 ha seedings; 3,330 km fence construction; 1,600

water developments and 741 km of pipelines (Heady and Bartolome 1977). The adjacent rangelands in Oregon, Idaho, and Nevada had only minor range improvements accomplished during this same 11-year period.

Now three years following the Vale project, it has been substantiated that the antelope population has increased 100 percent (from 1,000 to 2,000) while at the same time, antelope in surrounding adjacent rangelands have remained relatively static. The evidence is circumstantial, but it is indicative that properly implemented large-scale vegetative manipulation projects combined with water developments can be highly beneficial to wild free-roaming antelope herds.

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TABLE 1. ESTIMATED ANTELOPE POPULATIONS INHABITATING GRASSLAND AND GRASSLAND-BRUSHLAND COMMUNITIES (YOAKUM, 1972) IN CANDAA, MEXICO AND THE CONTINENTAL UNITED STATES

Vegetational community	Number	% of population
Grasslands		
Shortgrass	190,210	49
Mixedgrass	71,750	19
Total	261,960	68
Grassland-Shrubland		
Bunchgrass-Sagebrush	103,810	27
Grama-Mesquite	4,600	1
Galleta-Woodland	10,950	3
Total	119,360	31
Desert		
Hot and cold	4,170	1

TABLE 2. CHECKLIST OF PRONGHORN ANTELOPE REQUIREMENTS FOR HABITAT IN A GRASSLAND-SAGEBRUSH COMMUNITY.

Habitat characteristics	Antelope requirement[a]	Habitat characteristics	Antelope requirement[a]
ABIOTIC		BIOTIC (Cont'd)	Succulence: The more available year round the better in all plant species Communities: Variety and diversity important (meadows, intermittent lake beds, wild fire burns, etc.) Height: No higher than 24" preferably from 12-24"
1. Physiography	Large expanse area (10 miles minimum) - low rolling terrain - no major physical barriers (large rivers, mountain ranges, etc.)		
2. Climate			
- precipitation	10-15"		
- snow depth	Not over 10-15" for prolonged periods		
- temperature	Not a factor—populations in hot deserts to alpine meadows		
3. Soils	Not a determining factor except to soilsite relationships in which some sites do not grow the right vegetation	2. Animal	big game: Tolerable of all species Predators: Affect antelope to some extent, but rarely a limiting factor Man: Can or cannot be problem based on two major factors: - Effective enforcement of indiscriminate year long killing - Methods and practices of habitat or range management (Maintaining or improving vegetation, waters, fences, etc.)
4. Water	Desirable to have one quarter to one gallon per day for every day of year, particularly warm seasons. Water distribution every 3 to 4 miles		
BIOTIC			
1. Vegetation	Ground cover—most ranges have around 50% non-vegetation Composition: 40-60% Grass 10-30% Forbs 5-10% Browse Variety: Grass - 5 to 10 species Forbs - 20 to 40 species Browse - 5 to 10 species		

[a]These requirements must be available in the right combinations. Too much or too little of any one may become the major factor limiting antelope production or survival.

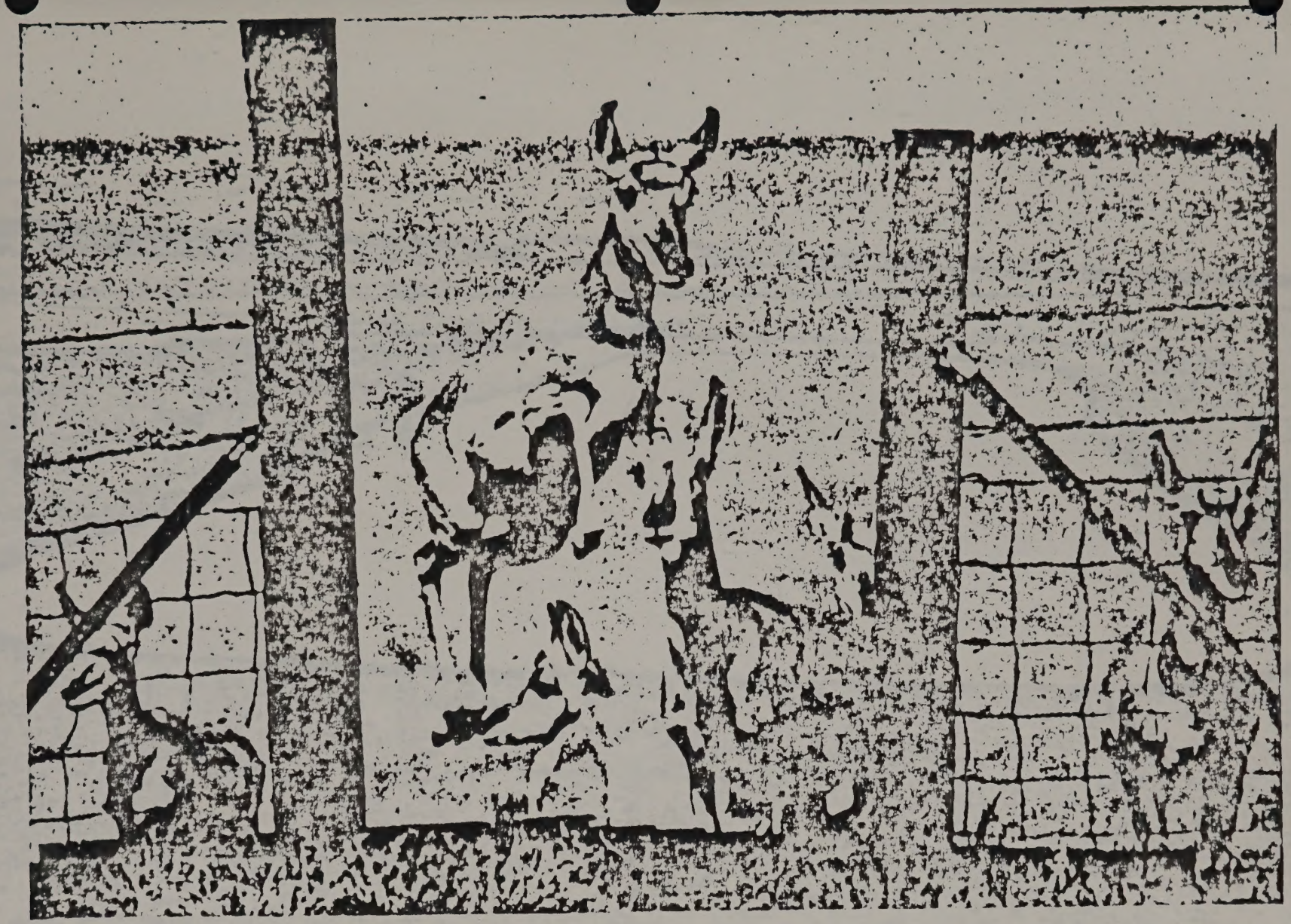
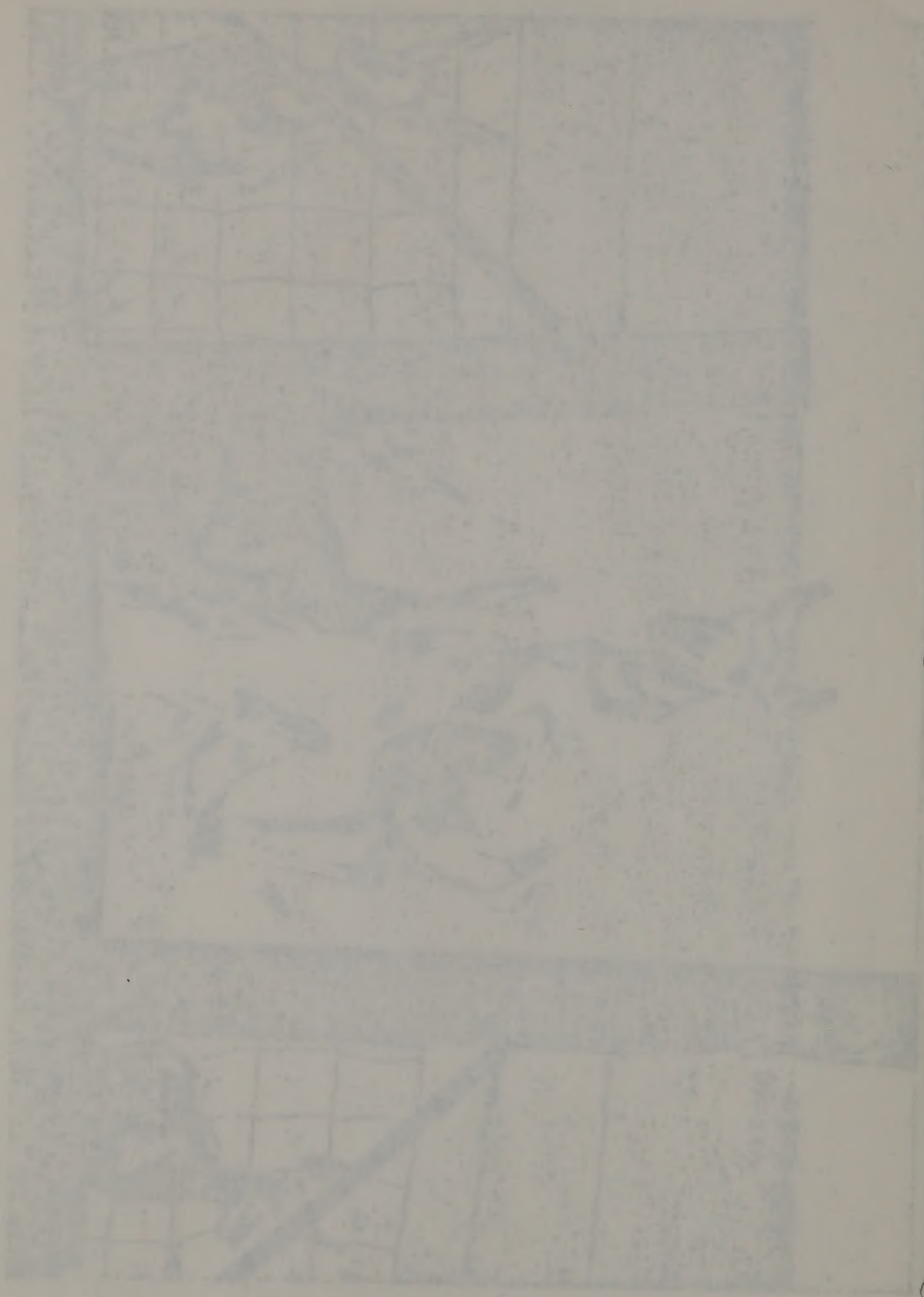


Fig. 1. An adult doe antelope jumps through an "antelope pass" structure constructed in a range fence near Casper, Wyoming. (Photo by Ray Mapston)



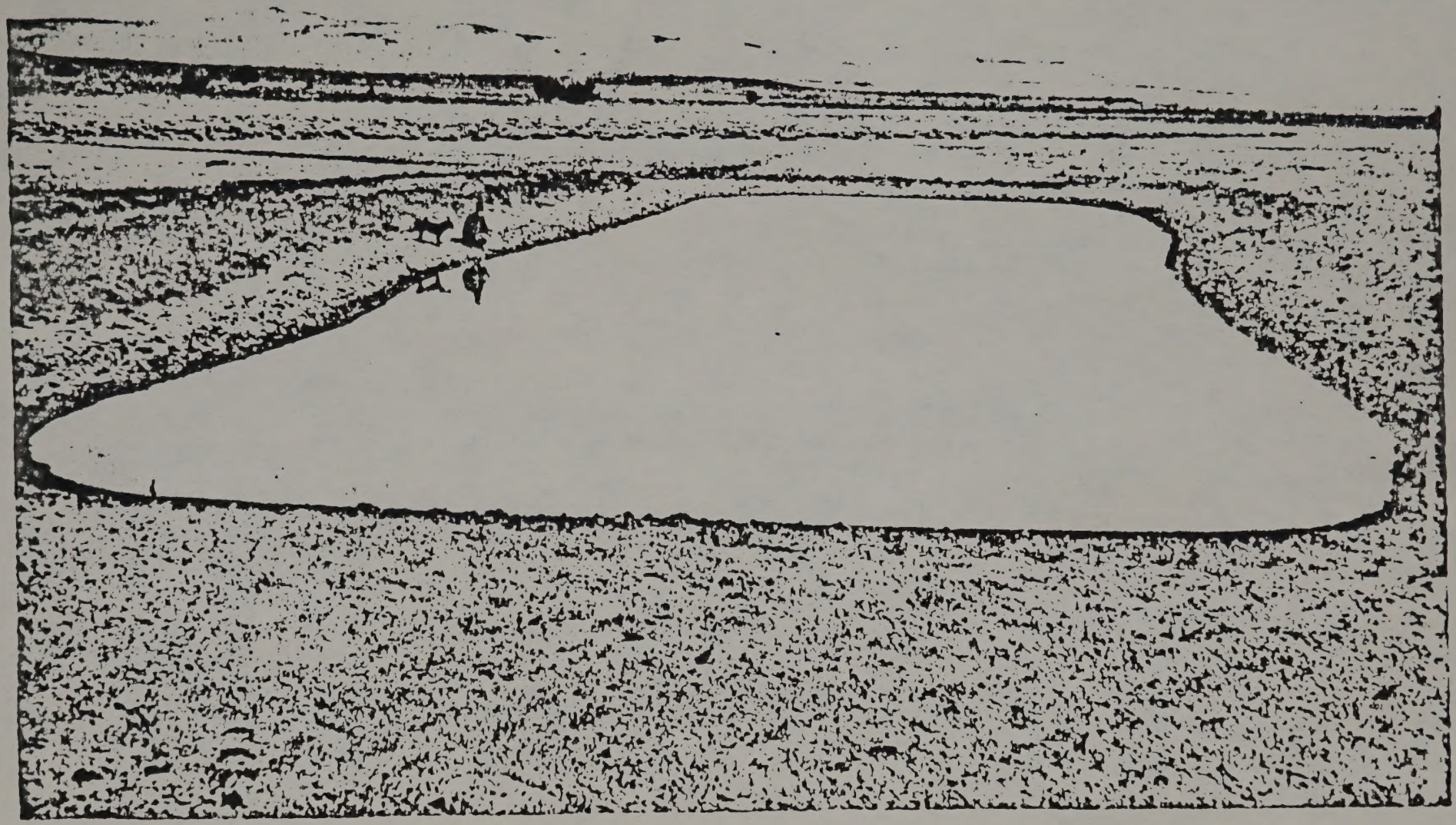


Fig. 2. Large open "dugout" water catchment pits, as portrayed above, have been highly used by antelope as well as livestock near Lakeview, Oregon. (Photo by Jim Yoakum)